

THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION.¹

AFTER getting free from the winter quarters in the South Orkneys on November 23, 1903, the *Scotia* left for the Falkland Islands and Buenos Aires to get into communication with home and obtain a fresh stock of coals and

laid—a pure white egg, deposited in a nest which consists of a few angular fragments of stone raked together on a bare ledge of the cliff.

While at Buenos Aires Mr. Bruce arranged for the Argentine Government to take over and continue the meteorological and magnetic observatory at Scotia Bay, South Orkneys.

On January 21, 1904, the *Scotia* left Buenos Aires with three Argentine men of science on board in addition to her own staff, and on February 22 they were left on the South Orkneys under the leadership of Mr. Mossman, who had consented to remain for a further period of twelve months.

This season the distribution of the pack ice was very different from that of the previous year. Almost no ice was met with near the Orkneys, and very little until reaching the Antarctic circle in about 32° W. long. In the beginning of March the previous year's southern record, and also that of Ross in 1843, was passed, but in 72° 18' S. 17° 59' W. a sudden change of conditions was met with. The water suddenly shallowed from about 2500 fathoms to 1131, and at the same time land was reported ahead. Steaming towards this we found a lofty ice-barrier stretching in a north-easterly and south-westerly direction, effectually barring further progress to the south. Close, heavy pack ice prevented a nearer approach than two miles. This barrier was traced for a distance of 150 miles to the south-west. In 73° 30' S. 21° 30' W., a depth of 159 fathoms was met with, the barrier being then two and a half miles off. In 74° 1' S. 22° 0' W., the

Scotia was nipped by the ice in a heavy N.E. gale, and was preparing to spend the winter there; but on March 13 the floe broke up and the ship was released. During the six days' imprisonment collections of the marine fauna were got from a depth of 161 fathoms, and a splendid view was obtained of the inland ice. Although no actual bare rock was

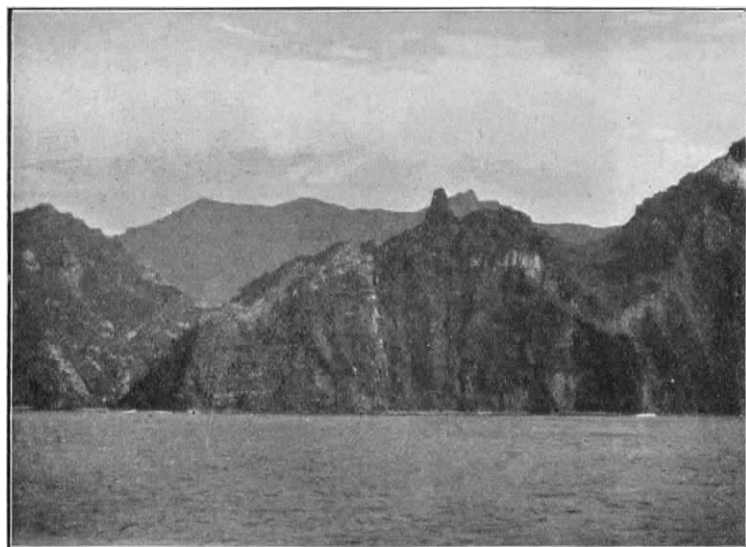


FIG. 1.—Gough Island, showing hanging valley truncated by shore cliff.

provisions. During the ship's absence a party of six men was left at Scotia Bay under the charge of Mr. R. C. Mossman to carry on the systematic meteorological, magnetic, and biological work.

Perhaps the most interesting discovery made by the summer party was the egg of the Cape pigeon (*Daption*

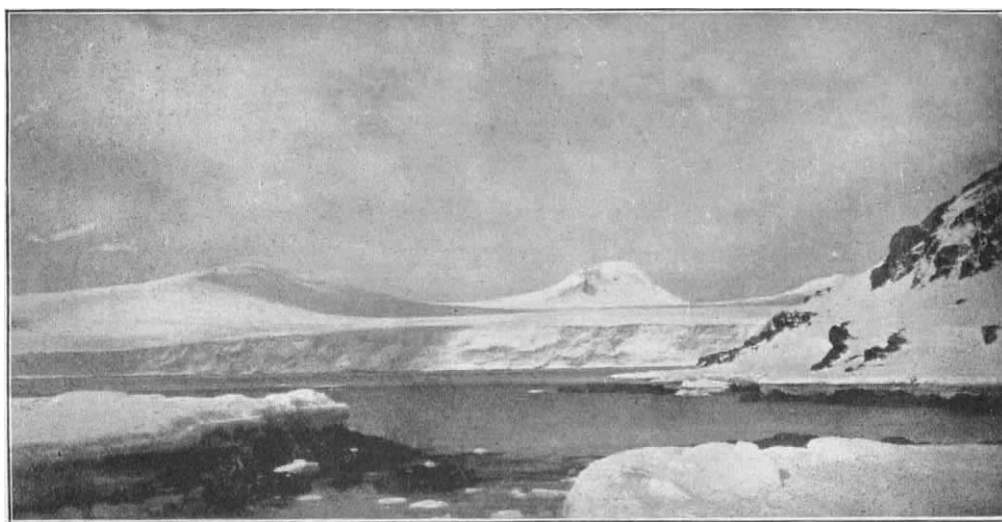


FIG. 2.—Glacier at head of bay, north coast of Laurie Island, South Orkneys.

capensis). Although known to breed on South Georgia and Kerguelen, its eggs had never hitherto been obtained. As is the case with the majority of petrels, only a single egg is

¹ Abstract of a paper on the "Second Antarctic Voyage of the *Scotia*," by Mr. J. H. Harvey Pirie and Mr. R. N. Rudmose Brown in the *Scottish Geographical Magazine*.

seen, there can be no doubt we were really on the edge of the Antarctic continent—off "Coats Land," as it has been named after Mr. James Coats, jun., and Major Andrew Coats, the two chief subscribers to the expedition. In this connection we quote the words of Mr. Bruce:—"I have been asked by several if I am sure that this great ice-

barrier was really part of the Antarctic continent. I have no hesitation in saying 'yes,' and my reasons are these: All our soundings between 60° and 70° S. were 2500 to 2700 fathoms. In 72° S. they shoaled to about 2300, fifty miles from the barrier. Thirty-five miles from the barrier they shoaled to 1400 and 1200 fathoms, and two miles from the barrier to 160 fathoms. This alone should answer the question in the way which I have done. Secondly, from the vertical cliff of ice 100 to 150 feet in height which bordered the ocean, the ice rose high inland in undulating slopes and faded away in height and distance into the sky. It was impossible to estimate the height of this field of ice—the true inland ice of Antarctica—but probably it was many thousands of feet. Thirdly, seals and birds, which up till now had become few in numbers, were seen in myriads—penguins, especially emperors, many petrels, and terns swarming in every direction—the inhabitants of the beaches and rocky cliffs of some actual land not very far distant."

After the escape from the ice the *Scotia* turned north-eastwards to continue the oceanographical survey of the Weddell Sea, and had some very successful deep-sea trawling in high southern latitudes—one haul in 71° 22' S. 16° 34' W. (1410 fathoms) yielding more than sixty species of animals. Ross's reported *deep* of 4000 fathoms no bottom was shown conclusively not to exist, the whole Weddell Sea



FIG. 3.—Weddell Seal—off Coats Land.

being apparently an almost level plain submerged between 2400 and 2700 fathoms.

Pursuing a track northwards along the meridian of 10° W., although encountering very heavy weather between 45° and 55° S. lat., some very interesting soundings were obtained demonstrating the extension of the mid-Atlantic ridge southwards as far as 52° S. lat. The diatom ooze band extends between 48° and 58° S.; to the south of this is blue-mud, the detritus of the Antarctic ice-sheets, to the north, globigerina ooze.

On April 22 a landing was effected with considerable difficulty on Gough Island, a previously unexplored outlier of the Tristan da Cunha group. This apparently entirely volcanic island is richly clad with vegetation, but the extremely precipitous nature of the ground prevented any extensive survey being made, though two new species of plants were obtained—a *Cotula* and an *Asplenium*; and amongst the birds two entirely distinct and new species of finches. Shallow water collections were got off the shore by means of the dredge and trap. Between Gough Island and Cape Town several soundings were taken between the parallels of 39° and 40°.

On February 8 of the present year, the Argentine sloop *Uruguay* returned to Buenos Aires from the South Orkneys, having brought back safely Mr. Mossman and his party, and landed a fresh staff there. The station is being continued for meteorological and magnetic work, and a complete outfit of self-recording magnetic instruments has been installed. This work is in connection with the systematic magnetic survey of Argentina which is at present being undertaken.

THE EARLY HISTORY OF SEED-BEARING PLANTS, AS RECORDED IN THE CARBONIFEROUS FLORA.¹

A LARGE number of the fern-like fronds of Carboniferous age, including many whole genera, as *Neuropteris*, *Alethopteris*, *Callipteris*, *Linopteris*, &c., have never been found to offer any satisfactory indications of a fern-like fructification. Some suspicion was thus awakened that such fronds may have belonged to plants other than true ferns.

Positive evidence first came from the anatomical side. The vegetative structure of *Lyginodendron Oldhamium* was completely worked out, chiefly by Williamson, and proved to present a combination of filicinean characters with those of cycadaceous gymnosperms. Similar results were attained in other genera, as *Heterangium*, *Medullosa*, *Calamopitys* and *Protopitys*, and hence the class Cycadofilices was founded to embrace these apparently intermediate forms. Decisive evidence as to the fructification was first obtained in 1903, when it was shown by Prof. F. W. Oliver, in collaboration with the lecturer, that the seed *Lagenostoma Lomaxi* agreed so closely in certain structural features with the associated *Lyginodendron Oldhamium* as to leave no doubt that the one belonged to the other. Observations on other *Lagenostomas* support this conclusion and show that the seeds were borne on modified fronds. It thus appears that the family *Lyginodendrea* consisted of seed-bearing plants, allied to the cycads, but retaining filicinean characters; their foliage was of a sphenopteroid type.

In another extensive family, that of the *Neuropterideæ*, precisely analogous conclusions have been reached. Here, too, the anatomical evidences indicated a position intermediate between ferns and cycads. In the case of *Neuropteris heterophylla* it has been proved by Mr. Kidston that large seeds, referred by him to the genus *Rhabdocarpus* of Goeppert and Berger, were borne on the frond. There are reasons for believing that *Trigonocarpon* was the seed of *Alethopteris*, and M. Grand'Eury, on the ground of extensive observations on the distribution of fronds and seeds, is led to conclude that the *Neuropterideæ* generally were seed-bearing plants, of cycadean affinity.

It has been proposed to group these fern-like seed-plants, which in Carboniferous times probably exceeded the ferns themselves in number, under the name *Pteridospermeæ*. Their relation to the fern-phylum is evident from many points in their structure, apart from the relatively unimportant external characters.

Other seed-bearing plants of the Carboniferous flora have long been known, notably the *Cordaiteæ*, great trees with large simple leaves, totally different from the *Pteridospermeæ* in habit, and with little indication of fern-like structure. The fructifications also are of a more advanced character than those of the *pteridosperms*. In the structure of the seeds, however, and in some anatomical points, a certain affinity, though a distant one, with that family is suggested. It is probable that the *Cordaiteæ* ultimately sprang from the same stock as the *Pteridospermeæ*, though at a very remote period. On the other hand, there is reason to believe that the *Coniferæ*, appearing at the close of the Palaeozoic period, were related to the *Cordaiteæ*. It is thus indicated as probable that the gymnosperms generally were, in a wide sense, of monophyletic origin, as having been ultimately derived from a common stock allied to the ferns; in a narrower sense they may be termed polyphyletic, as having sprung from this common stock at different points.

Although, as we now know, certain of the Palaeozoic lycopods had likewise attained to the production of a seed-like fructification, there is at present no satisfactory evidence for connecting the members of this phylum with any of the groups of seed-bearing plants which have come down to our own day.

¹ Abstract of the Wilde Lecture delivered before the Manchester Literary and Philosophical Society on February 28 by Dr. D. H. Scott, F.R.S.